REMARKS

The Office Action dated November 26, 2003, has been received and carefully noted. The above amendments and the following remarks, are submitted as a full and complete response thereto.

Claims 1-17 are pending in the present application. Claims 1, 3, 5, 7, 9 and 13 are amended. The amendments do not add new matter and require no further search. Thus, entry of the amendments at this time is proper. Favorable reconsideration of the patent application is respectfully requested.

Claim 9 is not anticipated by *Imatomi*

Claim 9 has been rejected under 35 U.S.C. §102(e) as allegedly anticipated by U.S. Patent No. 6,321,940 (*Imatomi*). This rejection is respectfully traversed.

Claim 9 recites a method for controlling an injection molding machine in order to control the movement of a molten resin in a heating cylinder of the injection molding machine. The injection molding machine includes a screw arranged within the heating cylinder to be rotatable and to be linearly movable, and having a flight of a pitch P. The molten resin is moved in a forward feeding direction during a plasticization process and an injecting process. The method includes the step of linearly moving the screw backwards relative to the forward feeding direction of the molten resin at a constant backward speed and simultaneously rotating the screw in the forward feeding direction at a rotation speed, after completion of the plasticization process or the injecting process.

Imatomi relates to an injection apparatus and method of controlling the same. *Imatomi* discloses that "[w]hen screw 12 is rotated in a forward direction during a metering step, pellets of resin are supplied. . . and molten resin is caused to advance." (Column 6, lines 20-23). *Imatomi* further discloses that "[a]s a result, the screw 12 reacts. . . and the molten resin is accumulated on the front side of the screw head." (Column 6, lines 24-26).

The Office Action alleges that "[t]he 'linearly moving' step merely requires causing the screw to move backwards linearly which *Imatomi* clearly teaches." Applicant submits that *Imatomi* does not disclose "linearly moving the screw backwards relative to the forward feeding direction of a molten resin at a constant backward speed and simultaneously rotating the screw in the forward feeding direction," as recited in claim 9. Instead, *Imatomi* describes the retraction of the screw is due to the back pressure of the molten resin, that promotes a non-linear/variable motion of the screw.

Applicant respectfully submits that *Imatomi* does not disclose, at the least, the retraction of the screw being carried out at a constant backward speed. In contrast, claim 9 recites "linearly moving the screw backwards relative to the forward feeding direction of the molten resin at a constant backward speed and simultaneously rotating the screw in the forward feeding direction." Thus, *Imatomi* does not disclose each and every element of the claimed invention.

At least in view of the above, Applicant respectfully submits that claim 9 is patentable over *Imatomi*. Thus, reconsideration and withdrawal of the anticipation rejection of claim 9 is respectfully requested.

Claims 1-17 are not rendered obvious by the cited references

Claims 1-12 have been rejected under 35 U.S.C. §103(a) as allegedly rendered obvious by U.S. Patent No. 4,879,077 (*Shimizu et al.*) in view of U.S. Patent No. 4,450,359 (*Yamazaki*). Further, claims 13-17 have also been rejected under 35 U.S.C. §103(a) as allegedly rendered obvious by Shimizu in view of Yamazaki. The Office Action alleges that it would have been obvious to one skilled in the art of the present invention to combine *Shimizu* and *Yamazaki* to obtain the claimed invention. The rejections are respectfully traversed.

Claim 1, and claim 2 which depends therefrom, recites a method for controlling an injection molding machine including a heating cylinder and a screw disposed in the heating cylinder, and performing a plasticization/measuring process and an injecting process. The method includes defining a synchronization ratio S of a rotation speed of the screw to be 100% when the position of a flight thereof does not apparently move relative to a constant backward speed V of the screw. The method also includes moving the screw backwards while rotating it after completion of the measuring process or the injecting process. A rotation speed R of the screw during the backward movement is given by multiplying the rotation speed R, which is expressed by the equation R = backward speed V/pitch P of the flight, by an arbitrary synchronization ratio Sx.

Claim 3, and claim 4 which depends therefrom, recites a method for controlling an injection molding machine including a heating cylinder, a screw disposed in the heating cylinder, a first driving source for driving the screw in an axial direction, a second driving source for rotating the screw, position detecting means for detecting an axial position of the screw, rotation-speed detecting means for detecting the rotation speed of the screw, and a controller for controlling the first driving source and the second driving source dependent on the detecting signals transmitted from the position detecting means and the rotation-speed detecting means, and performing a plasticization/measuring process and an injecting process. The method includes defining a synchronization ratio S of a rotation speed of the screw to be 100% when the position of a flight thereof does not apparently move relative to a constant backward speed V of the screw. The controller moves the screw backwards while rotating it after the completion of the measuring process or the injecting process. A rotation speed R of the screw during the backward movement is given by multiplying the rotation speed R, which is expressed by the equation, R = backward speed V/pitch P of the flight, by an arbitrary synchronization ratio Sx.

Claim 5, and claim 6 which depends therefrom, recites a method for controlling an injection molding machine in order to perform a resin plasticization/measuring process and an injecting process. The injection molding machine includes a heating cylinder and a screw having a flight of a pitch P. The screw is arranged within the heating cylinder. The method includes defining a synchronization ratio S with reference to a rotation speed

R and a constant linear backward speed V of the screw. The synchronization ratio S is equal to 100% when the flight does not apparently move while the screw is rotated and linearly moved backwards. The synchronization ratio S is smaller than 100% when the flight moves backwards while the screw is rotated and linearly moved backwards. The synchronization ratio S is greater than 100% when the flight moves forwards while the screw is rotated and linearly moved backward. The method also includes making the screw linearly move backward at a selected synchronization ratio Sx and simultaneously rotate after completion of the plasticization/measuring process or the injecting process. A selected rotation speed Rs of the screw is given by: Rs = (V/P) x Sx.

Claim 7, and claim 8 which depends therefrom, recites a method for controlling an injecting molding machine in order to perform a resin plasticization/measuring process and injection process. The injection molding machine includes a heating cylinder, a screw having a flight of pitch P and arranged within the heating cylinder, a first driving source for driving the screw in an axial direction, a second driving source for rotating the screw, a position detecting device for detecting an axial position of the screw, a rotation-speed detecting device for detecting the rotation speed of the screw, and a controller for controlling the first and second driving sources in response to detecting signals transmitted from the position detecting devices and the rotation-speed detecting device. The method includes defining a synchronization ratio S with reference to a rotation speed R of the screw in a constant linear backward speed V of the screw. The synchronization ratio S is equal to 100% when the flight does not apparently move while the screw is

rotated and linearly moved backwards. The synchronization ratio S is smaller than 100% when the flight moves backward while the screw is rotated and linearly moved backwards. The synchronization ratio S is greater than 100% when the flight moves forwards while the screw is rotated and linearly moved backwards. The method includes controlling the movement so that the screw is linearly moved backwards at a selected synchronization ratio Sx and simultaneously controlling the rotation of the screw, after completion of the plasticization/measuring process or the injecting process. A selected rotation speed Rs of the screw is given by: $Rs = (V/P) \times Sx$.

Claims 10-12 depend from claim 9 and recite subject matter in addition to the subject matter recited by claim 9, as discussed above.

Claim 13, and claims 14-17 which depend therefrom, recites a method for controlling an injection molding machine in order to control the movement of a molten resin by a screw in a heating cylinder of the injection molding machine. The screw is arranged within the heating cylinder to be rotatable and to be linearly moveable. The molten resin is moved in a forward feeding direction during a plasticization process and an injecting process. The method includes rotating the screw in the forward feeding direction at a rotation speed R and simultaneously and linearly moving the screw backwards relative to the forward feeding direction of the molten resin at a constant backward speed V.

Thus, according to claims 1, 3, 5, 7, 9 and 13, the screw is moved backwards while rotating it after completion of the measuring process or the injecting process. According

to these claims, the rotation speed of the screw during the backward movement is given by multiplying the rotation speed, which is expressed by the equation R = backward speed V/pitch P of the flight, by the arbitrary or selected synchronization ratio Sx. According to each of these claims, the rotation speed R is defined by the constant backward speed V of the screw. The cited references do not disclose or suggest these features.

Shimizu relates to a control method of an injection molding machine. *Shimizu* describes that screw 2 is rotated in the reverse direction to the rotational direction in the measuring process at the same time when the screw 2 is moved forward in the injection process. The apparent position of the ridge 2h or groove 2d of the screw 2 in a predetermined position of the heating cylinder becomes substantially stationary. *Shimizu* also describes that slight backward movement from this position can be allowed. Further, a predetermined speed can be set by, for example, R = VS/L, where VS is a forward moving speed of the screw.

The Office Action acknowledges that *Shimizu* does not disclose or suggest all the features of the claimed invention. The Office Action acknowledges that *Shimizu* does not disclose backward movement of the rotating screw. Applicant also submits that *Shimizu* does not disclose or suggest that the screw does not move backwards at a backward speed, wherein a rotation speed is defined by the constant backward speed during backward movement of the screw. Further, *Shimizu* does not disclose or suggest rotating the screw in the forward feeding direction and simultaneously and linearly moving the

screw backwards relative to the forward feeding direction of the molten resin at a constant backward speed V. Thus, *Shimizu* does not disclose or suggest at least these features of the claimed invention.

The Office Action, however, alleges that "*Yamazaki* was introduced and combined with *Shimizu* to meet this limitation." *Yamazaki* relates to an injection molding machine. *Yamazaki* describes a resin that is molten and plasticized by injection heating cylinder 21 that is stayed in the extreme end of the injection screw 20. *Yamazaki* also describes that as the molten resin increases, the injection screw 20 is withdrawn by resin pressure while being rotated. The draw of the screw of *Yamazâki* is due to the back pressure of the molten resin. *Yamazaki*, however, does not disclose or suggest constant backward speed of the screw by moving the screw backwards by rotating it after completion of the measuring process or the injecting process, wherein a rotation speed of the screw defined by the constant backward speed during the backward movement is given.

As discussed above, the claims recite finding a synchronization ratio of a rotation speed of the screw to be 100% when the position of a flight thereof does not apparently move relative to a constant backward speed V of the screw and moving the screw backwards while rotating it after completion of the measuring process or the injecting process, wherein a rotation speed R of the screw during the backward movement is given. Applicant submits that *Yamazaki* does not disclose or suggest a constant backward speed speed in moving a screw backwards. Applicant also submits that *Yamazaki* does not disclose or suggest rotating the screw in the forward feeding direction and simultaneously

and linearly moving the screw backwards relative to the forward feeding direction of the molten resin at a constant backward speed V. Thus, *Yamazaki* does not disclose or suggest those features missing from *Shimizu* to achieve the claimed embodiments. Therefore, neither *Shimizu* nor *Yamazaki*, either alone or in combination disclose or suggest all the features of the claimed invention.

Applicant also submits that the Office Action does not provide any evidence of a motivation to find the references. Though *Shimizu* and *Yamazaki* disclose injection molding machines, Applicant maintains that the machines described by the references are quite different. For example, *Shimizu* describes being designed to take advantage of two servomotors 24 and 28 while *Yamazaki* describes a machine designed to have a single servomotor 40. Applicant submits that one skilled in the art would not have been motivated to combine such dissimilar machines. "It is improper to combine references where the references teach away from their combination." *In re Grasselli, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983); MPEP 2145.* The proposed modification cannot render the prior art unsatisfactory for its intended purpose or change the principle of operation of a reference. *MPEP 2143.01.* Thus, Applicant maintains that one skilled in the art would not be motivated to combine *Shimizu* and *Yamazaki*.

At least in view of the above, reconsideration and withdrawal of the obviousness rejection of claims 1-17 is respectfully requested. It is respectfully requested that claims 1-17 be found allowable, and that this application be passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

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Enclosures: